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BIOLOGICAL EVALUATION OF PINE MORTALITY ON FIGUEROA MOUNTAIN, AND DWARF MISTLETOE AT SUNSET VALLEY, SANTA LUCIA RD, LOS PADRES NATIONAL FOREST

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ABSTRACT

Recent mortality of Coulter and ponderosa pines on Figueroa Mountain, Santa Lucia Ranger District, Los Padres National Forest, was evaluated. The trees had been attacked by western pine beetle, red turpentine beetle, and pine engraver, probably in response to stress brought on by drought conditions. The effectiveness of a dwarf mistletoe suppression effort on Digger pine in Sunset Valley was assessed. The Digger pine regeneration, which the District had hoped to protect from infection by removal of the overstory, nonetheless showed high levels of infection.

INTRODUCTION

On March 7 I accompanied David Schreiner, silviculturist for the Los Padres National Forest, to visit two sites on the Santa Lucia Ranger District of the Los Padres National Forest. Recently dead and dying ponderosa and Coulter pines had been observed on Figueroa Mountain. David Schreiner had examined six patches of such mortality in December 1988. Although past evaluations by Forest Pest Management had detected primarily bark beetle-caused mortality and Schreiner felt that this was true of the current situation, he requested a current evaluation of the area to rule out other possible causes of mortality.

During our evaluation, we examined three pockets of mortality for signs of bark beetle attack, annosus root disease, caused by Heterobasidion annosum, or other potential causes of mortality. The first location was a single-storied Coulter pine stand along the Catway Road; the second, a stand of Coulter pine which had

been burned recently, also on the Catway Road; and the third, a dense stand of young ponderosa pine below Figueroa Mountain Lookout. Scattered live oak was present in the stands.

The second site visited was Sunset Valley. A biological evaluation conducted by Forest Pest Management in December 1985 had identified dwarf mistletoe, Arceuthobium occidentale, as the most pervasive and damaging pest of Digger pine in the area. Development of a vegetation management plan for the entire area was recommended. The stand was subsequently entered to remove all overstory Digger pine in the central portion of the area, which serves as an entrance to the trailhead into the San Rafael Wilderness. The intent of the overstory removal was to prevent infection of the Digger pine regeneration present at the time, so that a coniferous component could be maintained at the site. The District is currently considering planting the site with containerized Digger pine stock.

FIGUEROA MOUNTAIN

Observations

Dead and dying trees at the first location examined along the Catway showed signs of infestation by the western pine beetle, Dendroctonus brevicomis, and the red turpentine beetle, Dendroctonus valens. All dead trees appeared to have died within the past six months to one year, with no evidence of older dead trees at the center of the group. Although one conk of Heterobasidion annosum was found in a stump approximately 50 feet from one of the dead pines, none of the dead and dying trees showed signs of annosus decay.

In the burned area along the Catway, the District suspected that mortality of young pines was due to the fire, which had burned hotter than anticipated. We found, however, that large as well as small trees were dead, and it seemed unlikely that the large trees, most of which had little to no fuels at their bases, could have been killed by a surface fire. In addition, signs of attack by the western pine beetle and the red turpentine beetle were found on these trees as well. No evidence of annosus root disease was present.

At the location below Figueroa Lookout, a situation similar to that found at the previous two locations was found in young suppressed ponderosa pine. The trees were growing in an extremely dense stand, which would be expected to be under a great amount of stress. Downhill from this stand was a small clump of larger ponderosa X Coulter pines which were dying from the top down. This would indicate an infestation of Ips (pine engraver) beetles. On closer inspection, these trees also had evidence of western pine beetle and red turpentine beetle attack. Fresh pitch tubes were present on these trees (lacking in those previously examined), and live western pine beetles were present in the cambium. No signs of annosus root disease were found.

Management Alternatives

The management alternatives recommended for this site in 1980 (Biological Evaluation dated 25 January 1980) are still valid, and include the following:

1. Do nothing: This will result in the stand undergoing additional mortality until the natural processes have reduced the stocking to levels that the site can support. There will be no selection of trees by the manager and it can be expected that group kills will occur. Leaving the dead trees will benefit some cavity-nesting birds, but will increase the hazard to recreationists.

2. Salvage dead trees: Removing dead trees will have no effect on the live basal area or the vigor of the stand. Some bark beetles will be removed from the area, but the effects on future mortality would be minimal. Salvaging would reduce the fire hazard, recreational hazard, and nesting sites for some wildlife. Several entries into stands will be necessary as additional trees die.

3. Salvage dead and declining trees, thin stands: This option gives the manager the most control over the appearance of the area. By removing dead and declining trees, hazards are reduced and fewer entries are necessary. Combining this salvage with a thinning brings the stocking down to acceptable levels and allows the manager to select what trees to retain.

Due to the potential for an increasing number of Heterobasidion annosum disease centers, FSM 2303 (FSM 9/86 R-5 SUPP 164) requires that newly created conifer stumps be treated with borax. This will prevent new infections of stumps and the development of additional disease centers. This treatment requires a pesticide-use request and an environmental analysis report.

If alternative 3 is selected, you may desire to remove some of the oak to help reduce the vegetative growing stock. There is a pathological consideration if this is done. The production of oak stumps increases the probability of infection by Armillaria sp., the shoestring root rot fungus. This fungus has the capability to grow from oak stumps to surrounding pines of all sizes. When pines are in close proximity to infected oak stumps, there is a greater opportunity that the pines can be infected by the fungus resulting in mortality of the pines. If oaks are harvested, it would be best to select those that are not within groups of pines or close to pines. Alternatively, the oaks may be pruned to reduce their transpiration and competition for moisture. This will have a more limited duration, but will reduce the opportunity for infection by Armillaria.

SUNSET VALLEY

Observations

In the treated area at Sunset Valley, approximately 75% of the Digger pine regeneration was infected with dwarf mistletoe, Arceuthobium occidentale. In untreated areas of the tract, both the overstory and the regeneration were moderately to heavily infected.

Alternatives

1. Do Nothing: In the treated areas, this alternative will result in some intensification of the parasite in the currently infected pine regeneration. If planting with Digger pine is attempted in these areas, the seedlings will eventually become infected with mistletoe from the present regeneration. The parasite will prevent the trees from developing into a healthy, vigorous stand. In the untreated area, infection levels will intensify and spread to adjacent lightly or non-infested areas. Infected trees will be more susceptible to bark beetle attack, and will be more affected by drought than would be healthy, uninfected trees.

2. Eradication: Elimination of the parasite from the previously treated area would involve removing all Digger pine from the area. Implementation of this alternative would allow for planting of the area with Digger pine stock. If care is taken to create or utilize already existing buffer strips around the planted area, there should be little threat of infection to the seedlings. Buffer strips should be at least as wide as the height of the highest mistletoe plants in the adjacent infested stand.

PEST BIOLOGIES

Western Pine Beetle

The western pine beetle, Dendroctonus brevicomis, breeds in the main bole of living ponderosa and Coulter pine larger than about 4 inches dbh. Normally it breeds in trees weakened by drought, overstocking, root disease, dwarf mistletoe or fire.

Adult beetles emerge and attack trees continuously from spring through fall. Depending on the latitude and elevation, there can be from one to four generations per year. The generations are difficult to distinguish because the prolonged period of initial attack and re-emergence of parent females to establish additional broods causes considerable overlapping of the generations.

Initial attacks are made about mid-bole and subsequent attacks fill in above and below. Pheromones released during a successful attack attract other western pine beetles. Attacking beetles may spill over onto nearby apparently healthy trees and overwhelm them by sheer numbers. Pitch tubes and red boring dust are indications of successful attacks.

Adults bore a sinuous gallery pattern in the cambium and the female lays eggs in niches along the sides. The larvae feed in the inner bark for a short distance and then turn into the outer bark to complete development.

Bluestain fungi introduced during successful attacks probably contribute to the rapid mortality associated with bark beetle attacks. Woodpeckers, predaceous beetles and low winter temperatures cause natural control.

Red Turpentine Beetle

The red turpentine beetle, *Dendroctonus valens*, occurs throughout California and can breed in all species of pines. It normally attacks injured, weakened or dying trees and freshly cut stumps. The adults are attracted by fresh pine resin. They often attack wounded trees in campgrounds or following logging, trees scorched by wildfire or prescribed burns, lightning-struck trees and root-diseased trees exhibiting resinosis.

Attacks usually occur at the soil line or root crown and are characterized by a large reddish pitch tube at the point of entry. On severely stressed trees or during periods of drought, attacks may occur underground on the main roots up to 15 feet from the bole and also on the bole to a height of 10 feet. If an attack is successful, the adults excavate an irregular gallery in the cambium and the female lays eggs along the sides. The larvae feed in a mass and destroy an area of cambium ranging from 0.1 to 1.0 square feet. Attacks do not always kill trees but may predispose them to attack by other bark beetles. Repeated or extensive attacks by the red turpentine beetle can kill pines.

Attacks occur throughout warm weather and peak at mid-summer. The number of generations varies from two years for a single generation at the coldest portions of its range to two or three per year in the warmest.